

WHAT IS CLAIMED IS:

1. An image pickup device comprising:
a plurality of pixels each including a photoelectric conversion unit, a semiconductor area to
5 which a signal from said photoelectric conversion unit is transferred, a transfer switch adapted to transfer the signal from said photoelectric conversion unit to said semiconductor area, and a read unit adapted to read out the signal from said semiconductor area; and
10 a drive circuit adapted to output a first level at which said transfer switch is set in an OFF state, a second level at which said transfer switch is set in an ON state, and a third level between the first level and the second level,
15 wherein said drive circuit controls to hold the third level for a predetermined time while said transfer switch is changing from the ON state to the OFF state.
- 20 2. A device according to claim 1, wherein said read unit includes an amplification transistor for amplifying and outputting the signal in said semiconductor area.
- 25 3. A device according to claim 1, wherein said photoelectric conversion unit includes an embedded photodiode.

4. A device according to claim 1, further comprising

an analog/digital conversion circuit adapted to convert a signal from each of said plurality of pixels
5 into a digital signal,
a signal processing circuit adapted to process the signal from said analog/digital conversion circuit, and
a recording circuit adapted to recording the signal processed by said signal processing circuit.

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5. An image pickup device comprising:

a plurality of pixels each including a photoelectric conversion unit, a semiconductor area to which a signal from said photoelectric conversion unit
15 is transferred, a transfer switch adapted to transfer the signal from said photoelectric conversion unit to said semiconductor area, and a read unit adapted to read out the signal from said semiconductor area; and
a drive circuit adapted to output a signal for
20 controlling said transfer switch so that a time during which said transfer switch changes from an ON state to an OFF state becomes longer than a time during which said transfer switch changes from the OFF state to the ON state.

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6. A device according to claim 5, wherein said read unit includes an amplification transistor for

amplifying and outputting the signal in said semiconductor area.

7. A device according to claim 5, wherein said
5 photoelectric conversion unit includes an embedded photodiode.

8. A device according to claim 5, further comprising

10 an analog/digital conversion circuit adapted to convert a signal from each of said plurality of pixels into a digital signal,

a signal processing circuit adapted to process the signal from said analog/digital conversion circuit, and

15 a recording circuit adapted to record the signal processed by said signal processing circuit.

9. An image pickup device comprising:

a plurality of pixels each including a
20 photoelectric conversion unit, a semiconductor area to which a signal from said photoelectric conversion unit is transferred, a transfer switch adapted to transfer the signal from said photoelectric conversion unit to said semiconductor area, and a read unit adapted to
25 read out the signal from said semiconductor area; and
a drive circuit adapted to control said transfer switch,

wherein a substantial driving force of said drive circuit for changing said transfer switch from an OFF state to an ON state is higher than a substantial driving force for changing said transfer switch from the ON state to the OFF state.

10. A device according to claim 9, wherein said read unit includes an amplification transistor for amplifying and outputting the signal in said semiconductor area.

15. A device according to claim 9, wherein said photoelectric conversion unit includes an embedded photodiode.

12. A device according to claim 9, further comprising
an analog/digital conversion circuit adapted to convert a signal from each of said plurality of pixels into a digital signal,

a signal processing circuit adapted to process the signal from said analog/digital conversion circuit, and

a recording circuit adapted to record the signal processed by said signal processing circuit.

13. An image pickup device comprising:
a plurality of pixels each including a

photoelectric conversion unit, a semiconductor area to which a signal from said photoelectric conversion unit is transferred, a transfer switch adapted to transfer the signal from said photoelectric conversion unit to
5 said semiconductor area, and a read unit adapted to read out the signal from said semiconductor area; and
a drive circuit adapted to control said transfer switch,

wherein said transfer switch comprises a
10 transistor of a first conductivity type, and said drive circuit includes at least a structure formed by connecting the transistors of the first conductivity type in series.

15 14. A device according to claim 13, wherein said read unit includes an amplification transistor for amplifying and outputting the signal in said semiconductor area.

20 15. A device according to claim 13, wherein said photoelectric conversion unit includes an embedded photodiode.

25 16. A device according to claim 13, further comprising

an analog/digital conversion circuit adapted to convert a signal from each of said plurality of pixels

into a digital signal,

a signal processing circuit adapted to process the signal from said analog/digital conversion circuit, and

a recording circuit adapted to record the signal
5 processed by said signal processing circuit.

17. An image pickup device comprising:

a plurality of pixels each including a
photoelectric conversion unit, a semiconductor area to
10 which a signal from said photoelectric conversion unit
is transferred, a transfer switch adapted to transfer
the signal from said photoelectric conversion unit to
said semiconductor area, and a read unit adapted to
read out the signal from said semiconductor area; and
15 a drive circuit adapted to output a signal adapted
to control said transfer switch so that a fall speed
Voff for changing said transfer switch from an ON state
to an OFF state has a relation $10 \text{ V/sec} > V_{\text{off}}$.

20 18. A device according to claim 17, wherein said
read unit includes an amplification transistor for
amplifying and outputting the signal in said
semiconductor area.

25 19. A device according to claim 17, wherein said
photoelectric conversion unit includes an embedded
photodiode.

20. A device according to claim 17, further comprising

an analog/digital conversion circuit adapted to convert a signal from each of said plurality of pixels
5 into a digital signal,

a signal processing circuit adapted to process the signal from said analog/digital conversion circuit, and

a recording circuit adapted to record the signal processed by said signal processing circuit.

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21. An image pickup device comprising:

a plurality of pixels each including a photoelectric conversion unit, a semiconductor area to which a signal from said photoelectric conversion unit
15 is transferred, a transfer switch adapted to transfer the signal from said photoelectric conversion unit to said semiconductor area, and a read unit adapted to read out the signal from said semiconductor area; and

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a drive circuit adapted to control said transfer switch,

wherein said drive circuit includes a constant current circuit.

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22. A device according to claim 21, wherein said read unit includes an amplification transistor for amplifying and outputting the signal in said semiconductor area.

23. A device according to claim 21, wherein said photoelectric conversion unit includes an embedded photodiode.

5 24. A device according to claim 21, further comprising

an analog/digital conversion circuit adapted to convert a signal from each of said plurality of pixels into a digital signal,

10 a signal processing circuit adapted to process the signal from said analog/digital conversion circuit, and

a recording circuit adapted to record the signal processed by said signal processing circuit.

15 25. A drive method for an image pickup device including a plurality of pixels each including a photoelectric conversion unit, a semiconductor area to which a signal from said photoelectric conversion unit is transferred, a transfer switch adapted to transfer
20 the signal from said photoelectric conversion unit to said semiconductor area, and a read unit adapted to read out the signal from said semiconductor area, comprising:

an output step of outputting a first level at
25 which said transfer switch is set in an OFF state, a second level at which said transfer switch is set in an ON state, and a third level between the first level and

the second level,

wherein the third level is held for a predetermined time while said transfer switch is changing from the ON state to the OFF state.

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26. A drive method for an image pickup device including a plurality of pixels each including a photoelectric conversion unit, a semiconductor area to which a signal from said photoelectric conversion unit is transferred, a transfer switch adapted to transfer the signal from said photoelectric conversion unit to said semiconductor area, and a read unit adapted to read out the signal from said semiconductor area, comprising:

15 an output step of outputting a signal adapted to control said transfer switch so that a time during which said transfer switch changes from an ON state to an OFF state becomes longer than a time during which said transfer switch changes from the OFF state to the
20 ON state.

27. A drive method for an image pickup device including a plurality of pixels each including a photoelectric conversion unit, a semiconductor area to which a signal from said photoelectric conversion unit is transferred, a transfer switch adapted to transfer the signal from said photoelectric conversion unit to

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said semiconductor area, and a read unit adapted to read out the signal from said semiconductor area, comprising:

- 5 an output step of outputting a signal adapted to control said transfer switch so that a fall speed V_{off} for changing said transfer switch from an ON state to an OFF state has a relation $10 \text{ V/sec} > V_{off}$.